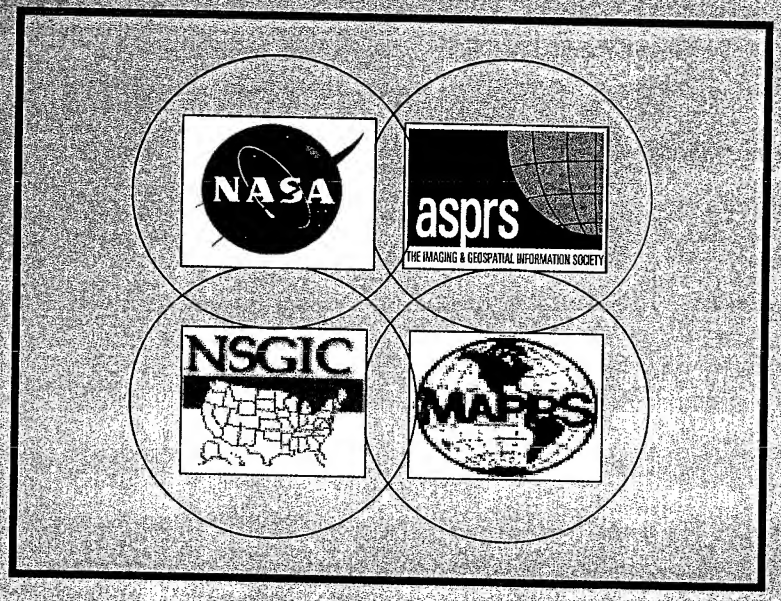
The 10-Year Remote Sensing Industry Forecast and Analysis



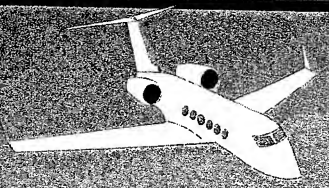
DRAFT

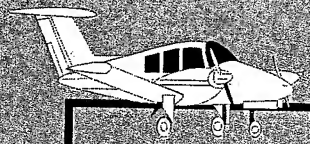
DRAFT

MAPPS Winter Meeting
January 19-23, 2002

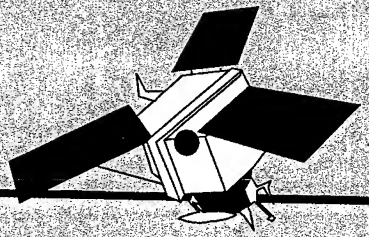
Ron Rabin, Lockheed Martin, Stennis Space Center

Remote Sensing Industry Definition





Platforms & Sensors



Phase I

Data Collection

Data Processing

Support Elements

- Hardware
- Software
- Etc.

Industry Intermediaries

- VARs
- Consultants
- Etc.

Business Segments

End-User

Phase II

NSGIC

MAPPS

Forecast Participants

- NASA
- NOAA
- USGS

- ASPRS
- NSGIC
- MAPPS

- Space Imaging
- Kodak
- SPOT
- EarthData
- PAR
- Autometrics
- Spencer-Gross
- American Forests
- RAND
- Pictometry
- Leading Edge
- Lockheed Martin
- Geomatics
- Eaglescan
- Landcare Avn.

- University of Arizona
- University of Utah
- University of Missouri
- RIT

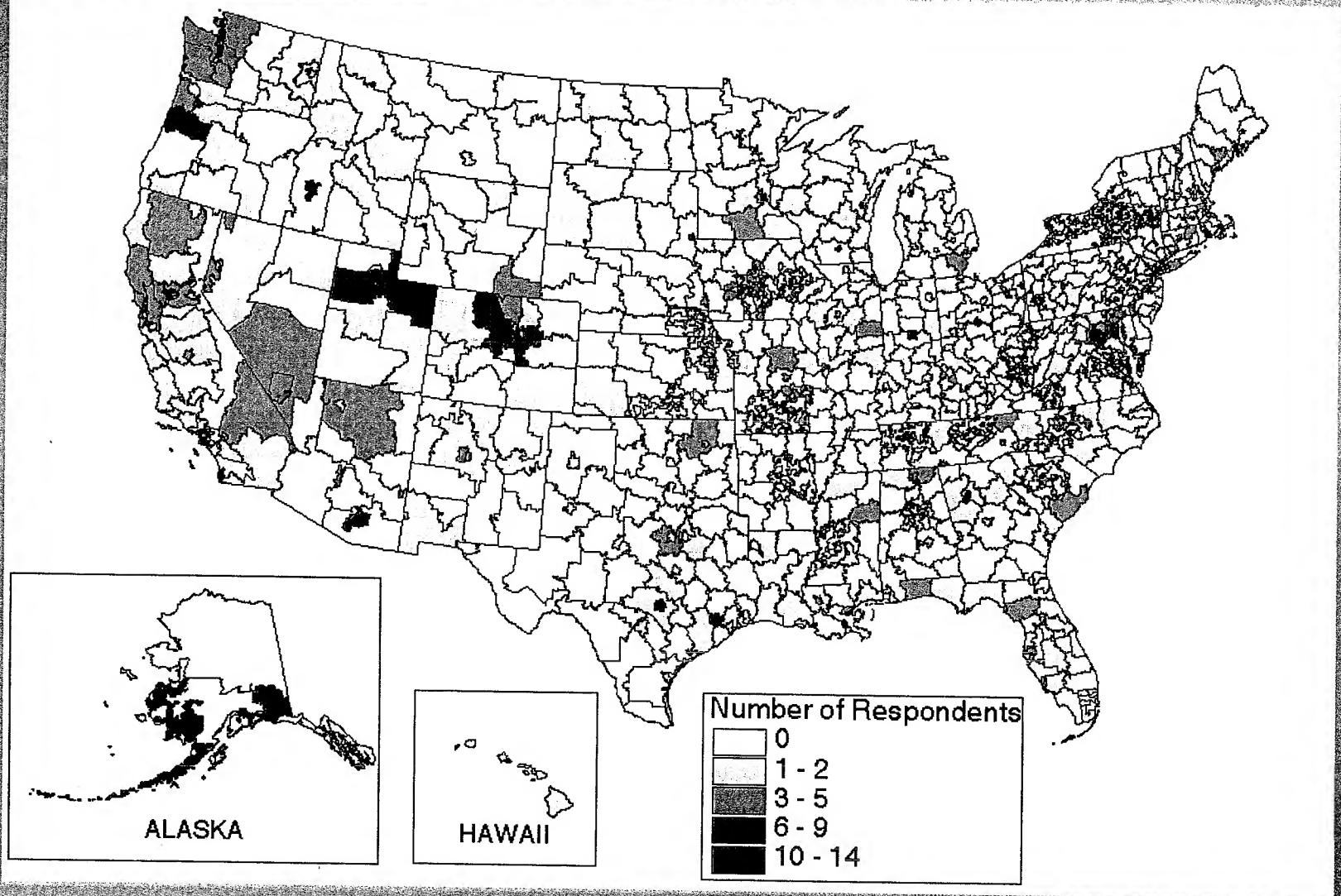
Data Collection to Date

✓ **Phase I**

- **Interviews:** 36 (Commercial)
- **Surveys:** 437 (Commercial, Government, Academia)
- **"Closed Envelope:** 38 (Commercial, Senior level)

✓ **Phase II**

- **Interviews** 134 (Managers, Users, SLT Government)
- **Focus Groups** 5 (NSGIC, Local GIS, ASPRS/MAPPS, URISA, Western Foresters)
- **Surveys** > 700 and counting


ALASKA
HAWAII
Number of Respondents
0
1 - 2
3 - 5
6 - 9
10 - 14

Assumption

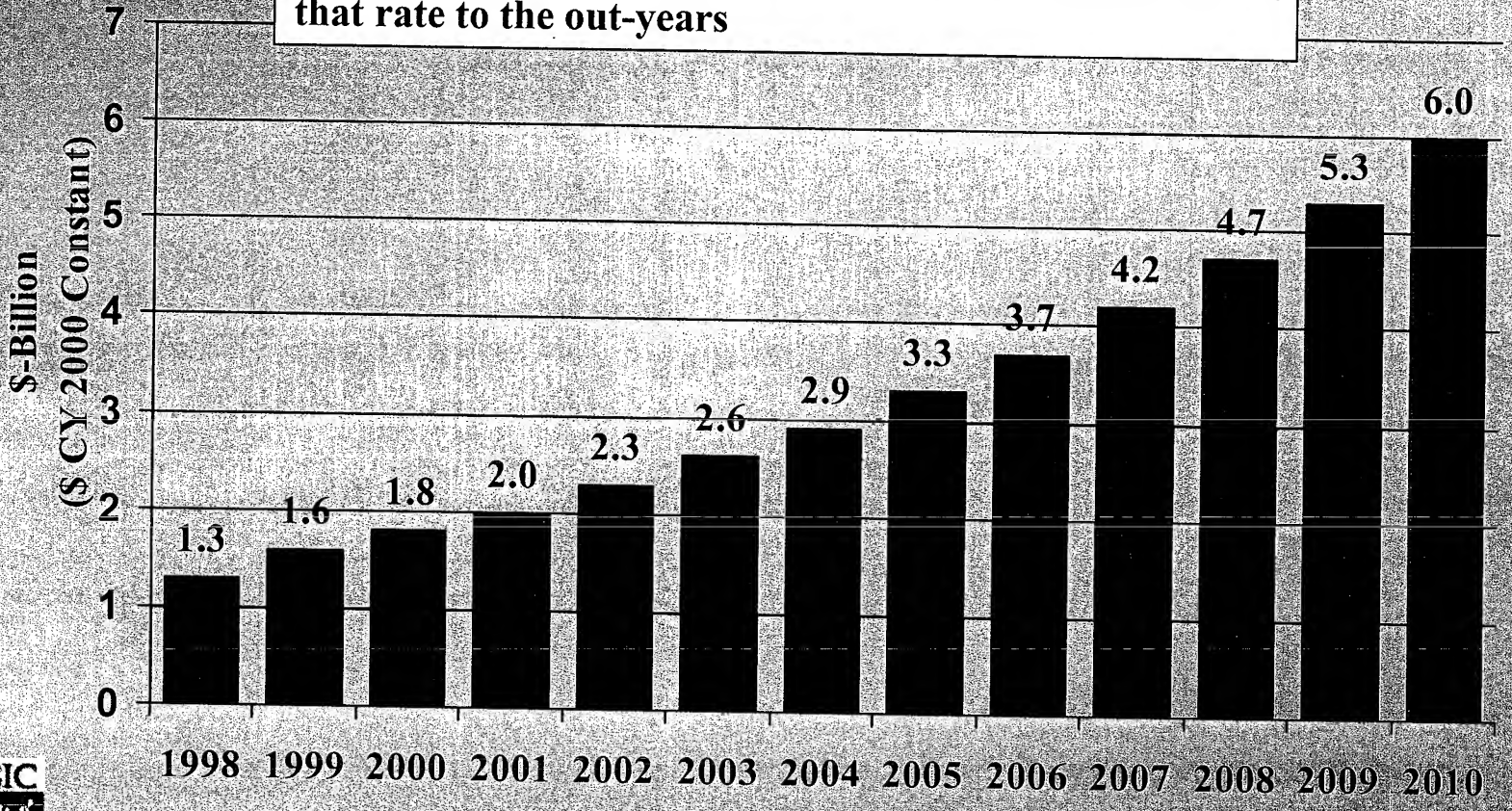
✓ **We have a representative sample.**

- **About 1450 industry professionals**
  - ➜Phase I
    - ⇨ 36 Interviews (commercial); 437 survey responses; Closed Envelope (43)
  - ➜Phase II
    - ⇨ 134 Interviews; 733 Surveys; 5 Focus Groups (@15 people per)
- **Geographic Dispersion**
- **Breadth of participation**

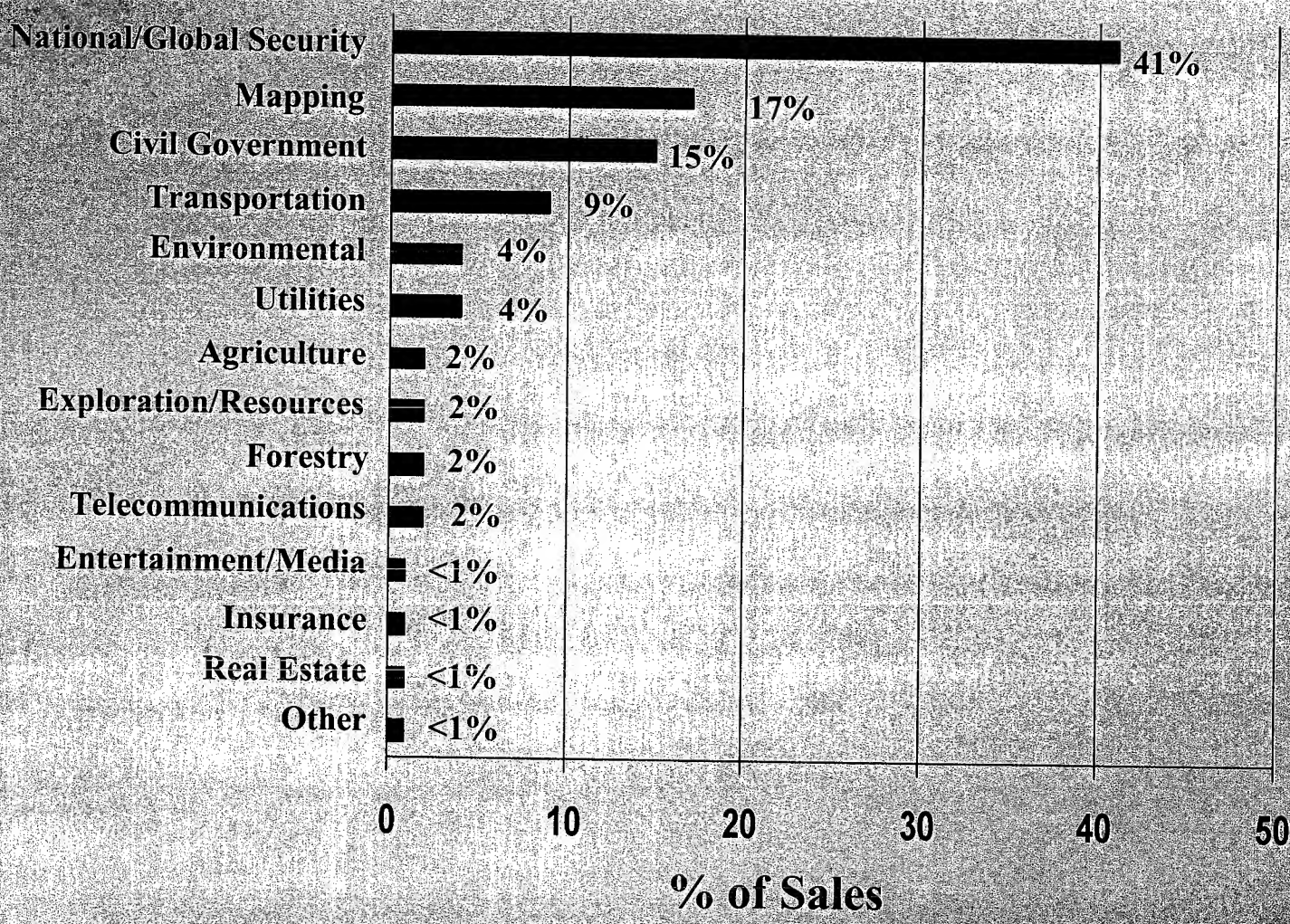
Estimated CRSI Sales 1998 to 2010

Forecast Baseline

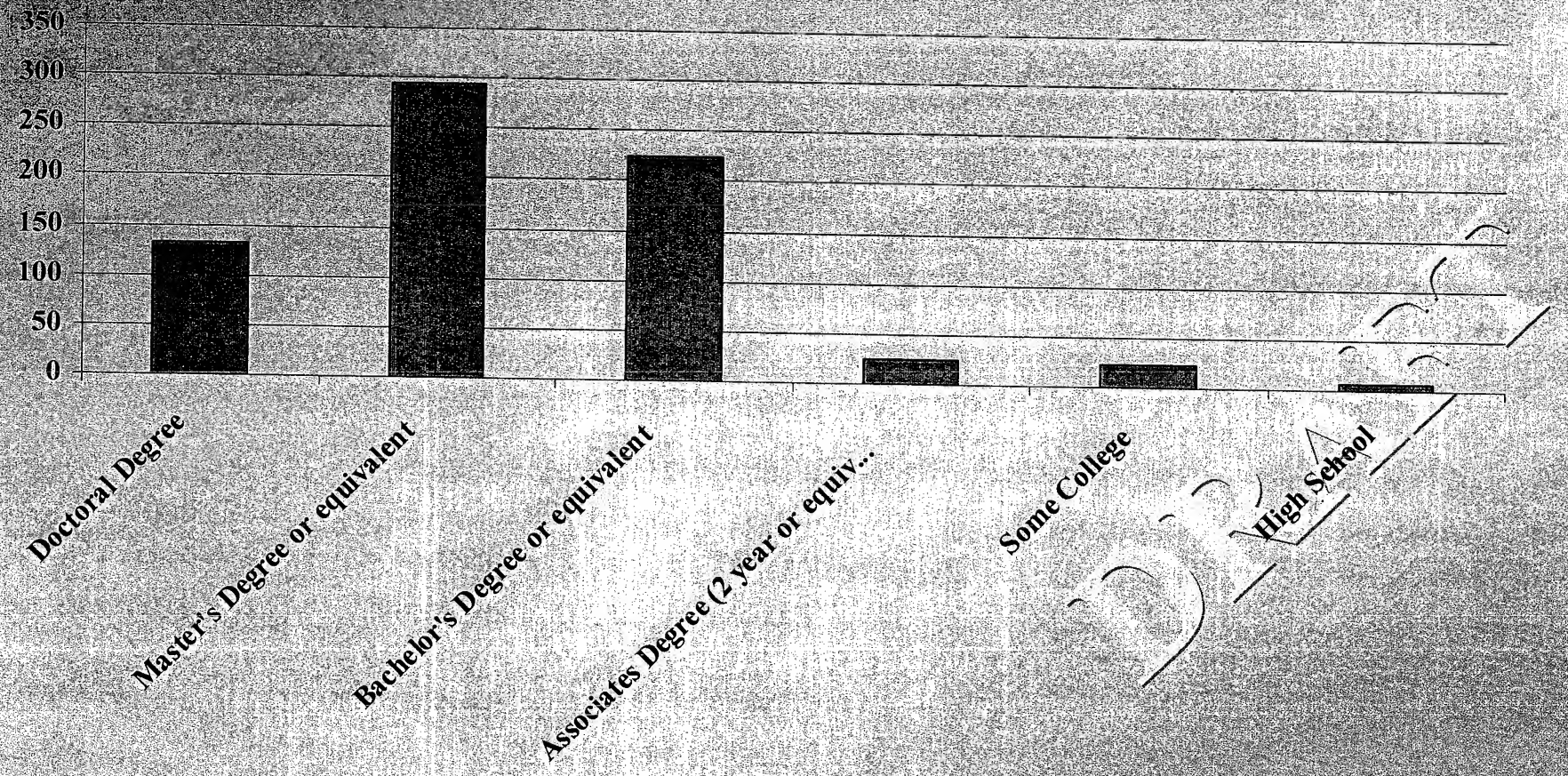
Based on calculating the average annual growth rate from 1998-2000 (respondent estimates) and applying that rate to the out-years



Market Segment as % of Sales CY 2000



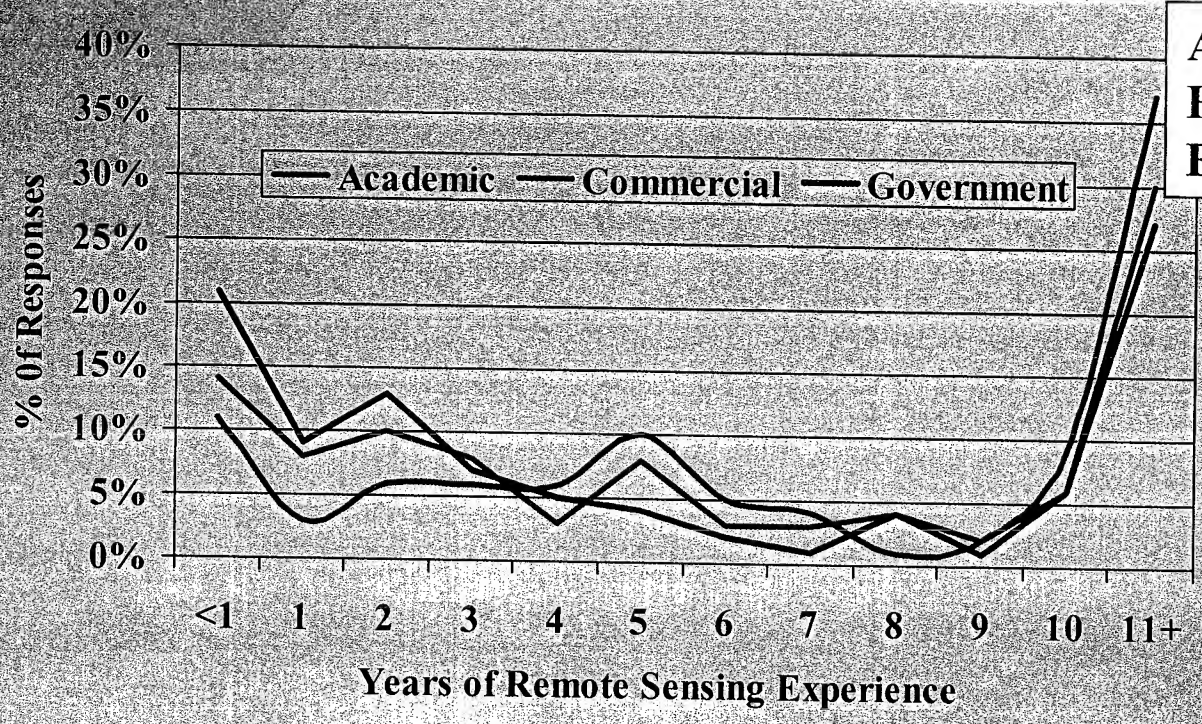
Educational Levels by Sector



A Very Well Educated Industry

- Greater than 90% of the respondents have a 4-year college degree.
- Over 60% of the respondents have a Masters degree or better.

Remote Sensing Experience

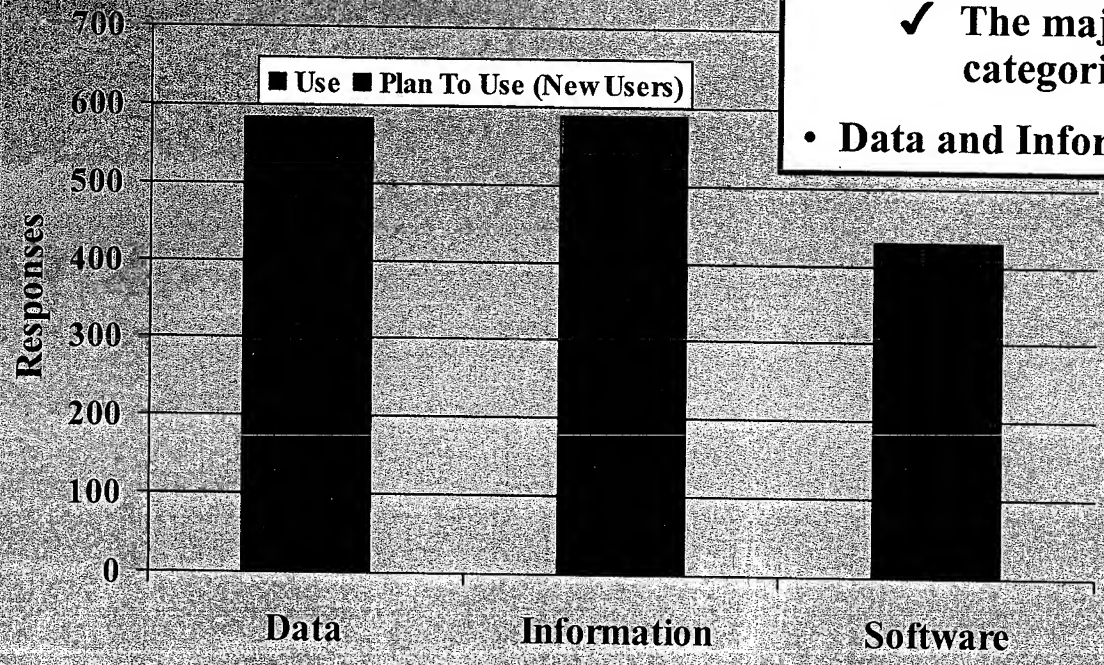


About one-third Have 11+ years Experience

- A bi-modally distributed workforce
- Government has most "entry levels"(>20%) , but least with 10/11+ years of experience (<30%)
- Academia has nearly 40% with 11+ years experience

Use/Plan To Use Remote Sensing Data/Information/Software

- >700 Respondents; 1600Responses
  - ✓ The majority of Respondents use at least two categories
- Data and Information are used more than Software



Estimated short term growth: 8.0%

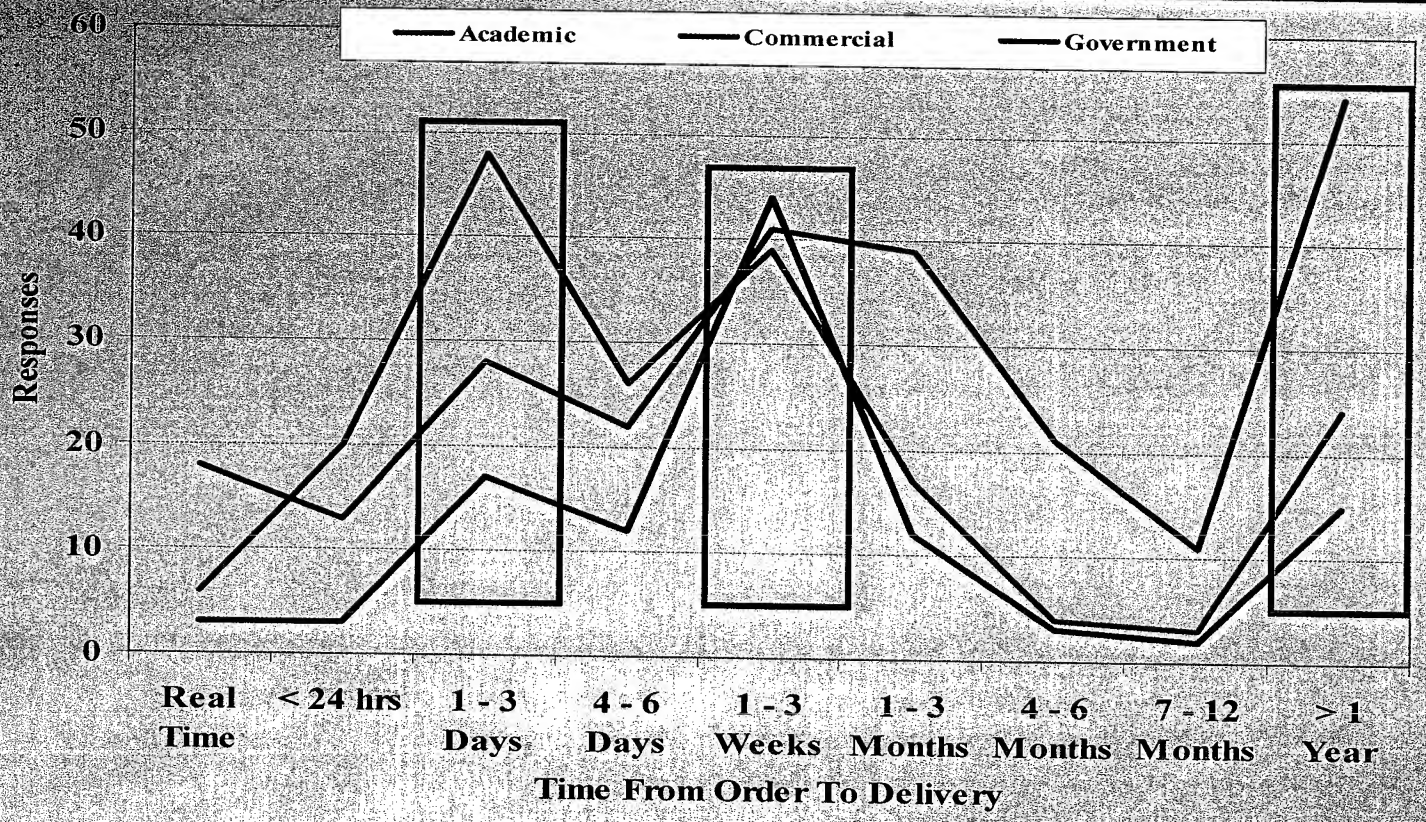
- Data: 9.3%
- Information: 8.0%
- Software: 6.5%

Overview Reliance on Sources of DIS by Sector

Sector	Data	Information	Software
Academic	45%	32%	23%
Commercial	42%	37%	21%
Government	42%	41%	16%

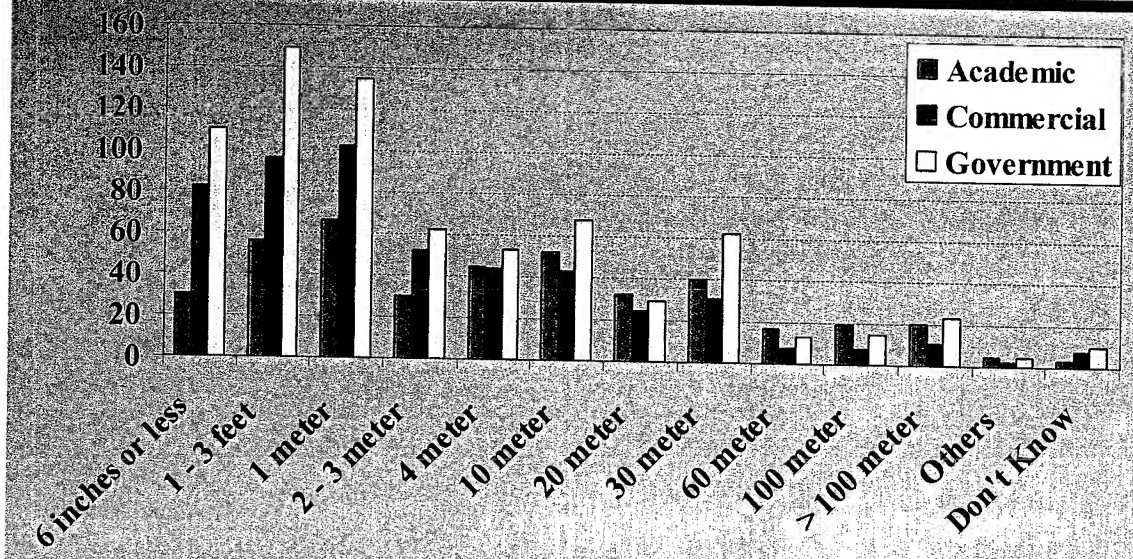
- Generally, there is more reliance on Data; less on Software
- Sectors are about the same with regard to Data
- Commercial and Government Sectors are more inclined to rely on Information; Academic less so
- Academic and Commercial Sectors are more inclined to rely on Software; Government less so

Timeliness Requirements



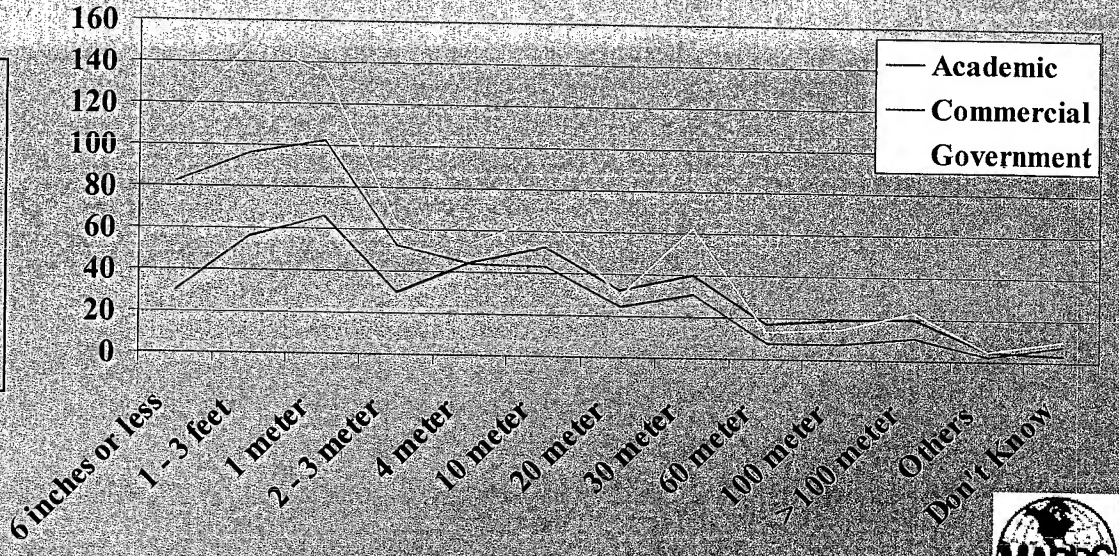
- Government Sector has more interest in "Real Time" ranges than other Sectors
- Nearly 60% of Commercial Sector interest centers on the "1-3 Days" and "1-3 Weeks" ranges
- All Sectors show high interest in the "1-3 Weeks" range
- Timeliness requirements mirror from sector to sector.
- Cluster around the "1 – 3 Day"; "1-3 Week".

Spatial Resolution Needed by Sectors

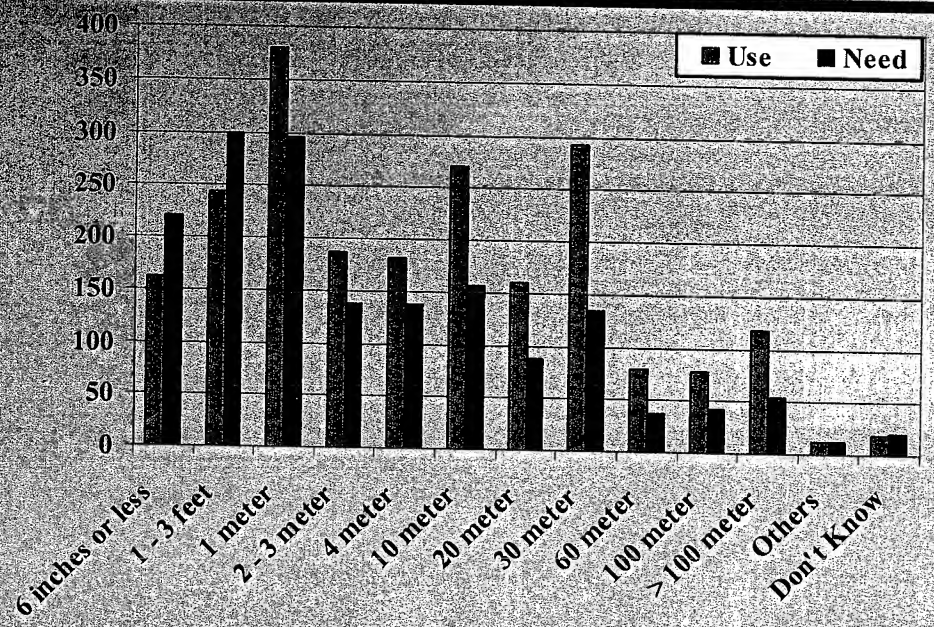


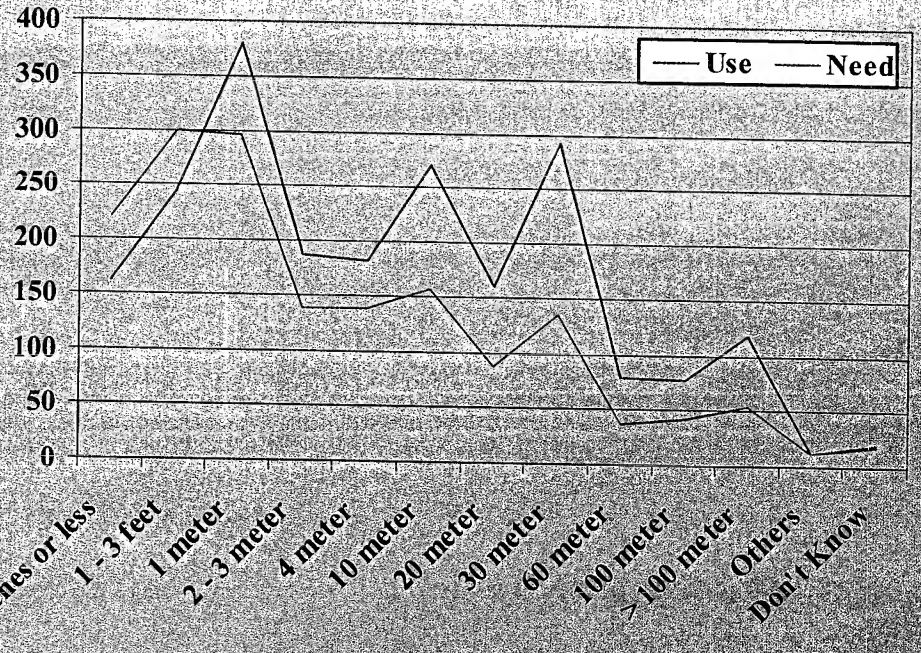
- The "Spatial Resolution" of choice for meeting future needs is 1 meter or less
- Spatial Resolution needs tend to cluster at the generally available 1; 10; and 30 meters
- There is a continued need at >100 meters

There were 26% more responses to "Use" than to "Need". By inference, the Needs of Users of Remote Sensing D/I/S concerned with Spatial Resolution are being met 74% of the time.



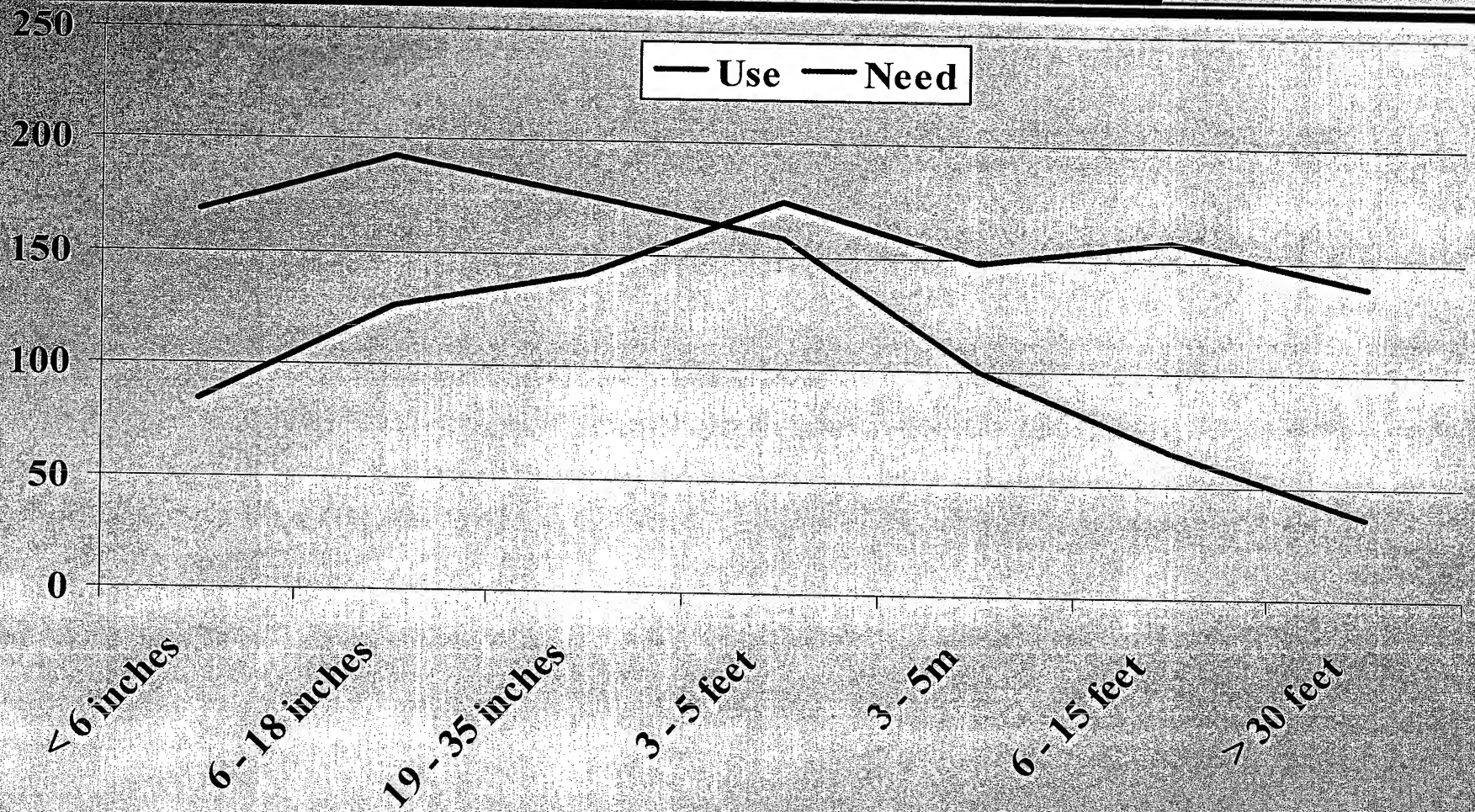
Spatial Resolution Use Vs. Need





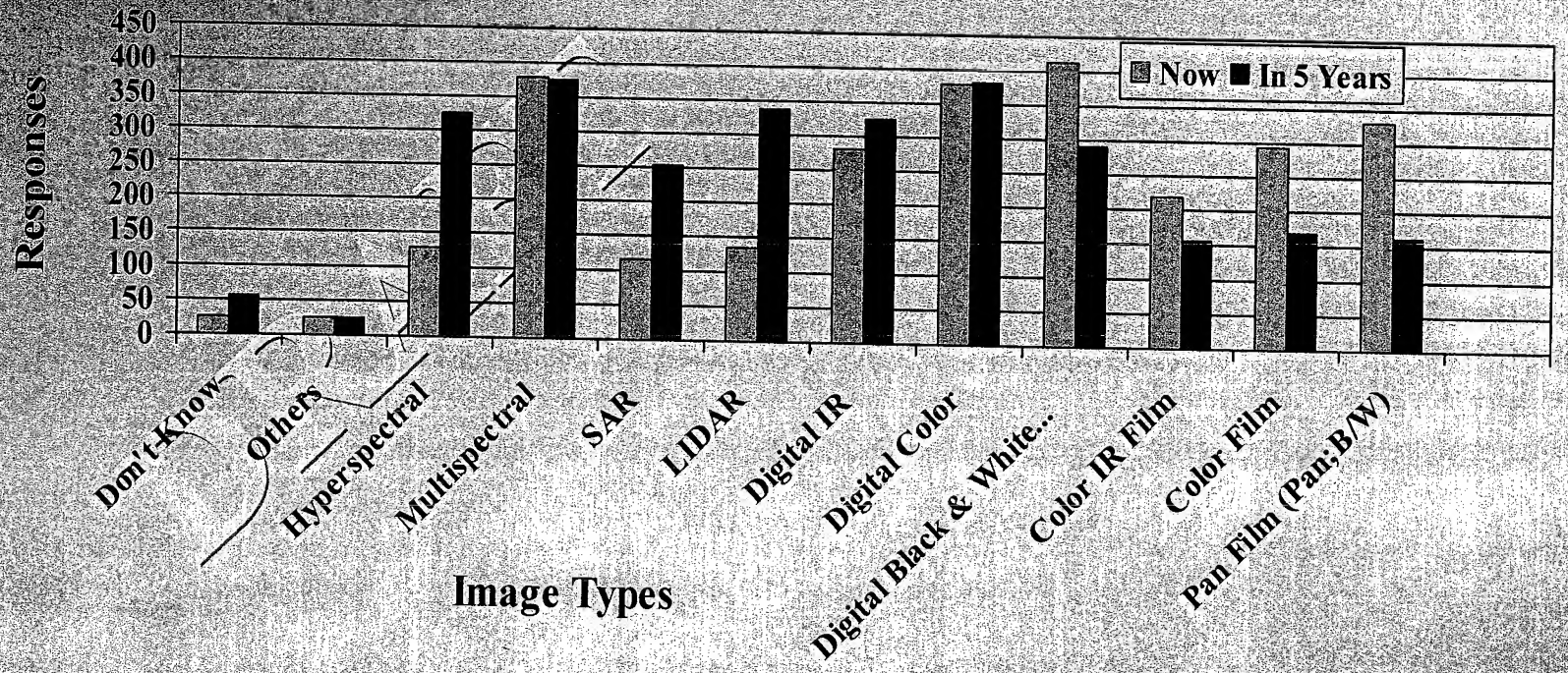
The data from the respondents indicates that the major "need" across the sectors is for Spatial Resolutions less than a meter.
Migration Data

Elevation Accuracy Use Vs. Need



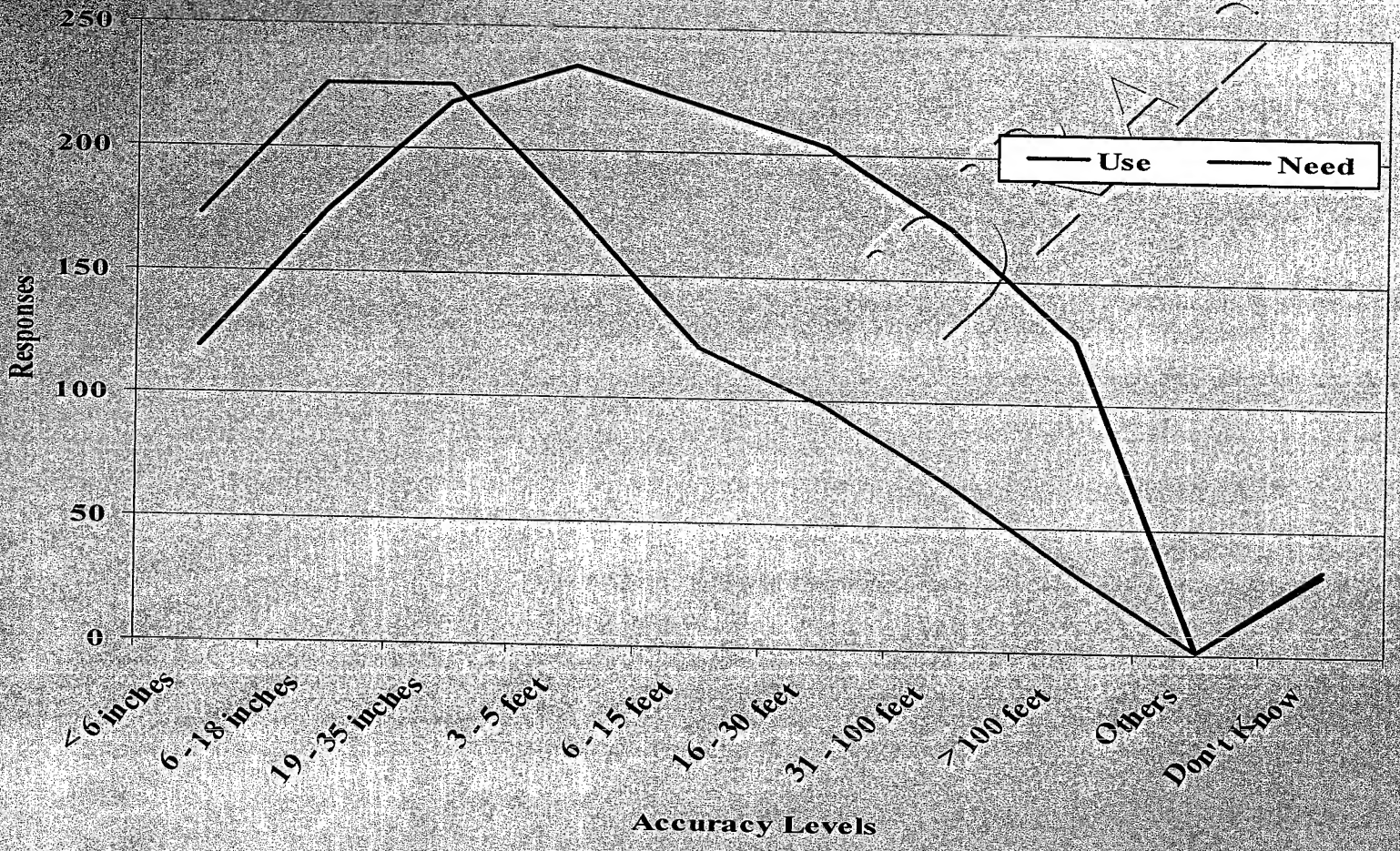
- 3-5 Feet Elevation Accuracy is the cross over
- The trend is to increased Elevation Accuracy

Use of Image Types: 2001Vs. 2006



Increase Most		Increase		About Same		Decrease Most	
Don't Know	40%	Digital Color	7%	Digital Color	<-1%	Digital B/W	17%
Hyperspectral	44%			Multispectral	<-1%	Color IR	17%
SAR	44%					Color Film	27%
LIDAR	37%					Pan B/W	37%

Geo-location Accuracy



It appears that there is a need for increased geo-location accuracy, especially at the 3 feet and less levels

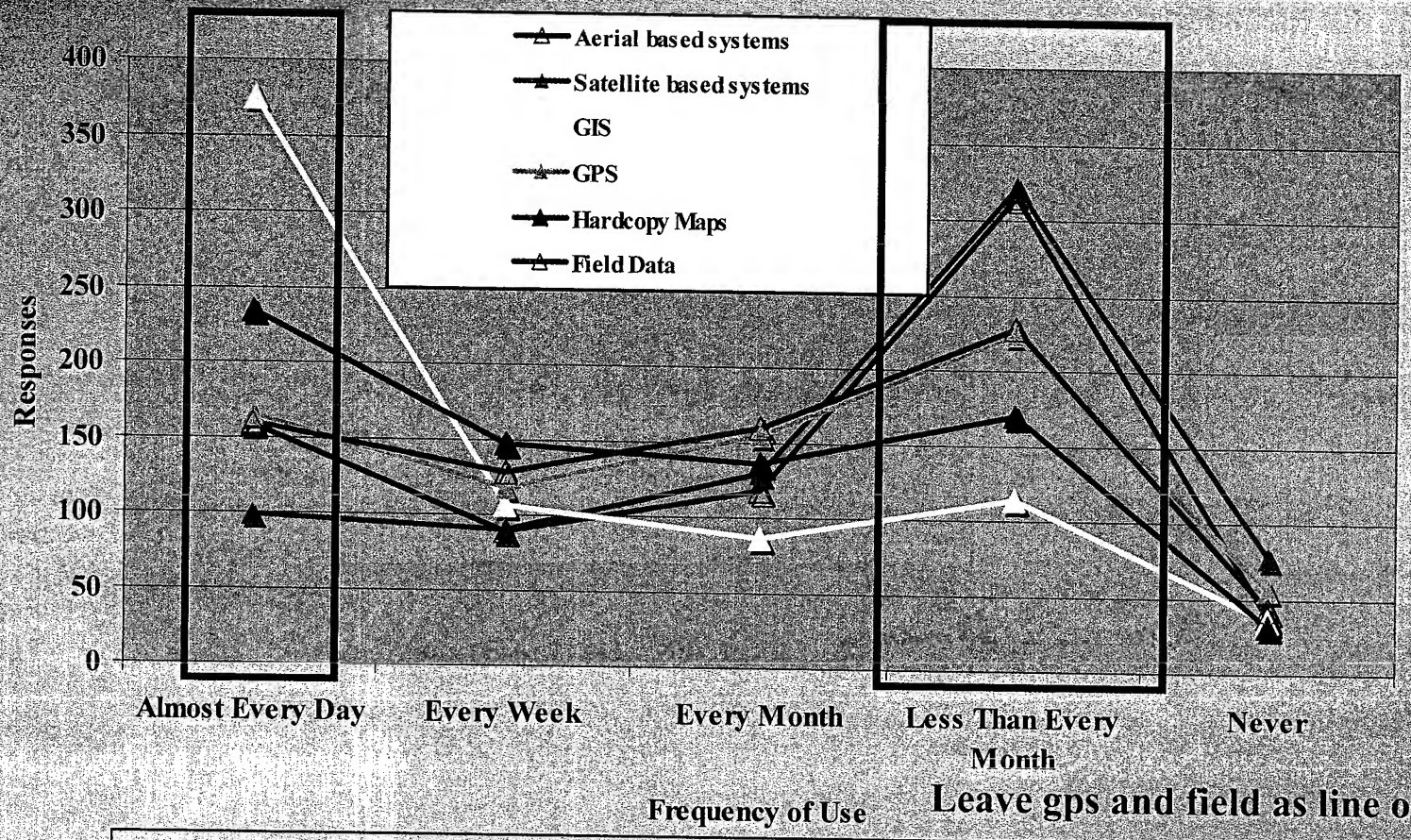
How Often Do You need Data / Information from the following : All Sectors

	Almost Every Day	Every Week	Every Month	Less Than Every Month	Never	Total
Aerial based Systems	22%	12%	16%	44%	5%	717
Satellite based Systems	14%	13%	18%	45%	11%	717
GIS	52%	15%	12%	16%	5%	717
GPS	23%	16%	22%	31%	8%	717
Hardcopy Maps	33%	21%	19%	24%	4%	717
Field Data	22%	18%	22%	32%	6%	717

- White Boxes w/Black numbers: Most Needed
- White Boxes w/Red numbers: Never Needed

Reverse total and never columns <done> and add never into total <done>
Change numbers to % <done>
no shades of gray in total
Test xyz type chart

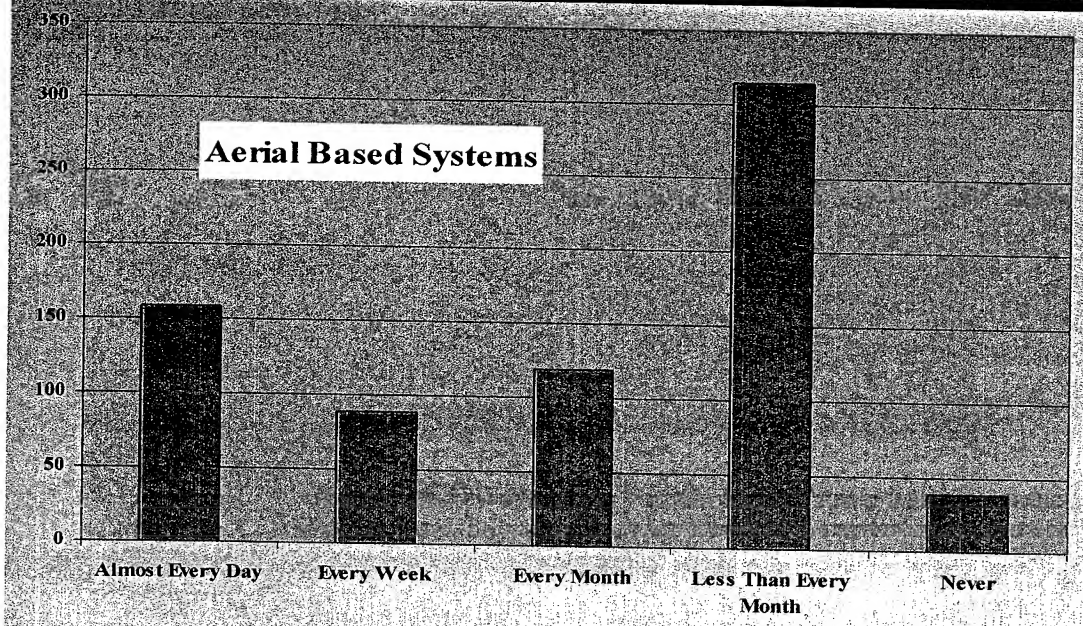
How Often Data/Information by General Type is Needed : All Sectors



Leave gps and field as line other bars

- GIS And Hardcopy Maps are most often needed "Almost Every Day"; Satellite-based System Data / Information least
- The Bi-modality indicates some tools are frequently used "Almost Every Day" others "Less Than Every Month
- There may be a relationship between frequency of need and frequency of up-dates required

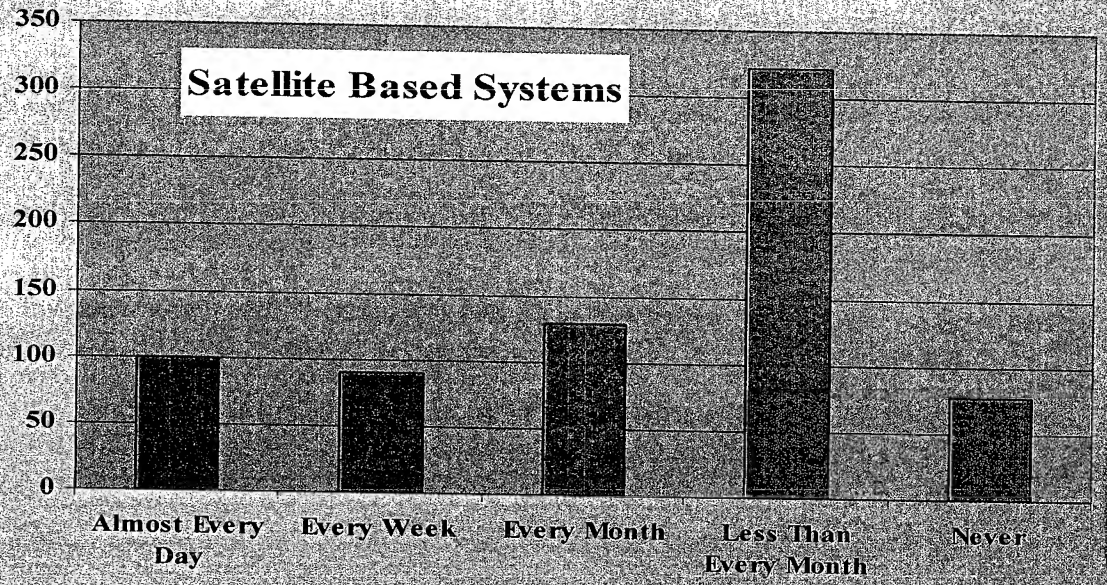
How Often Data/Information by General Type is Needed : All Sectors



Aerial and Satellite appear to follow a similar trend in collection profile

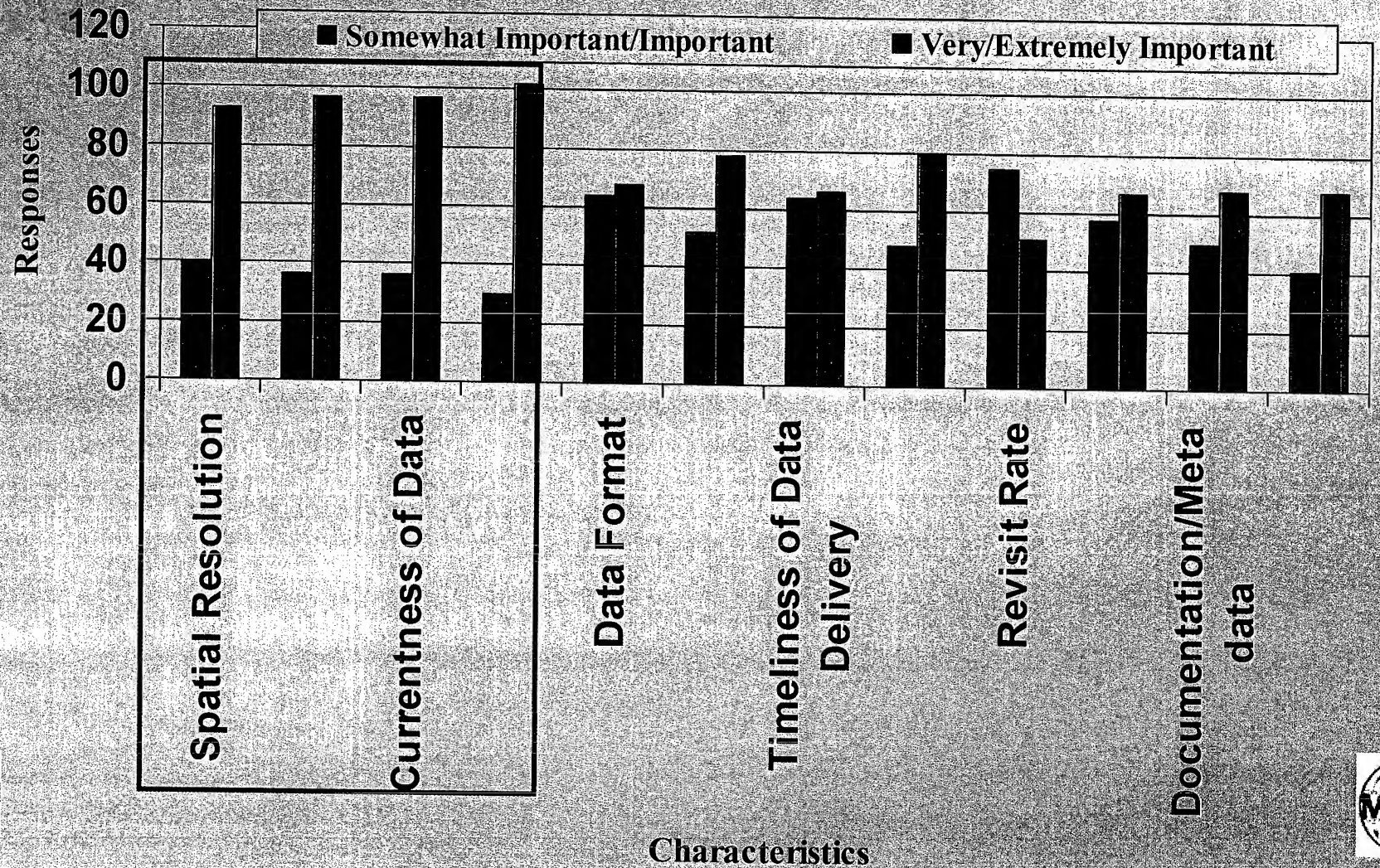
The "Every Day and Never" differences may be based on the significant number of aerial versus satellite providers and product differentiation

Do T test

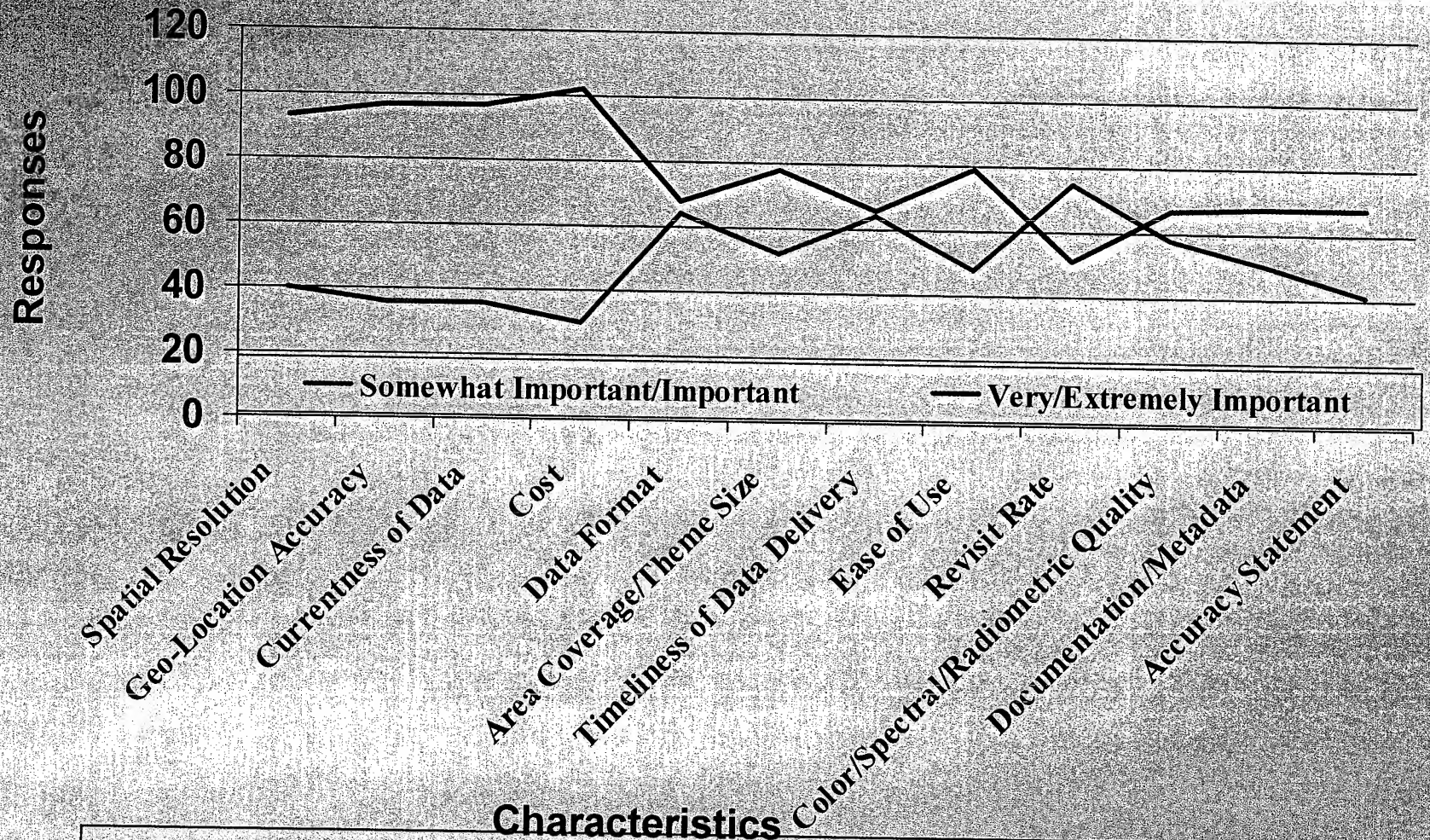


Importance of D/I/S Characteristics: All Sectors

Assume the "Somewhat Important" and "Important" dimensions are nearly the same. Make a similar assumption re: "Very Important" and "Extremely Important"



Importance of D/I/S Characteristics: All Sectors



In the aggregate of all Sectors, Cost; Currentness of Data; Geo-Location Accuracy; and Spatial Resolution are *most important* while Revisit Rate is *least important*

Most Important D/I/S Characteristics Across Sectors

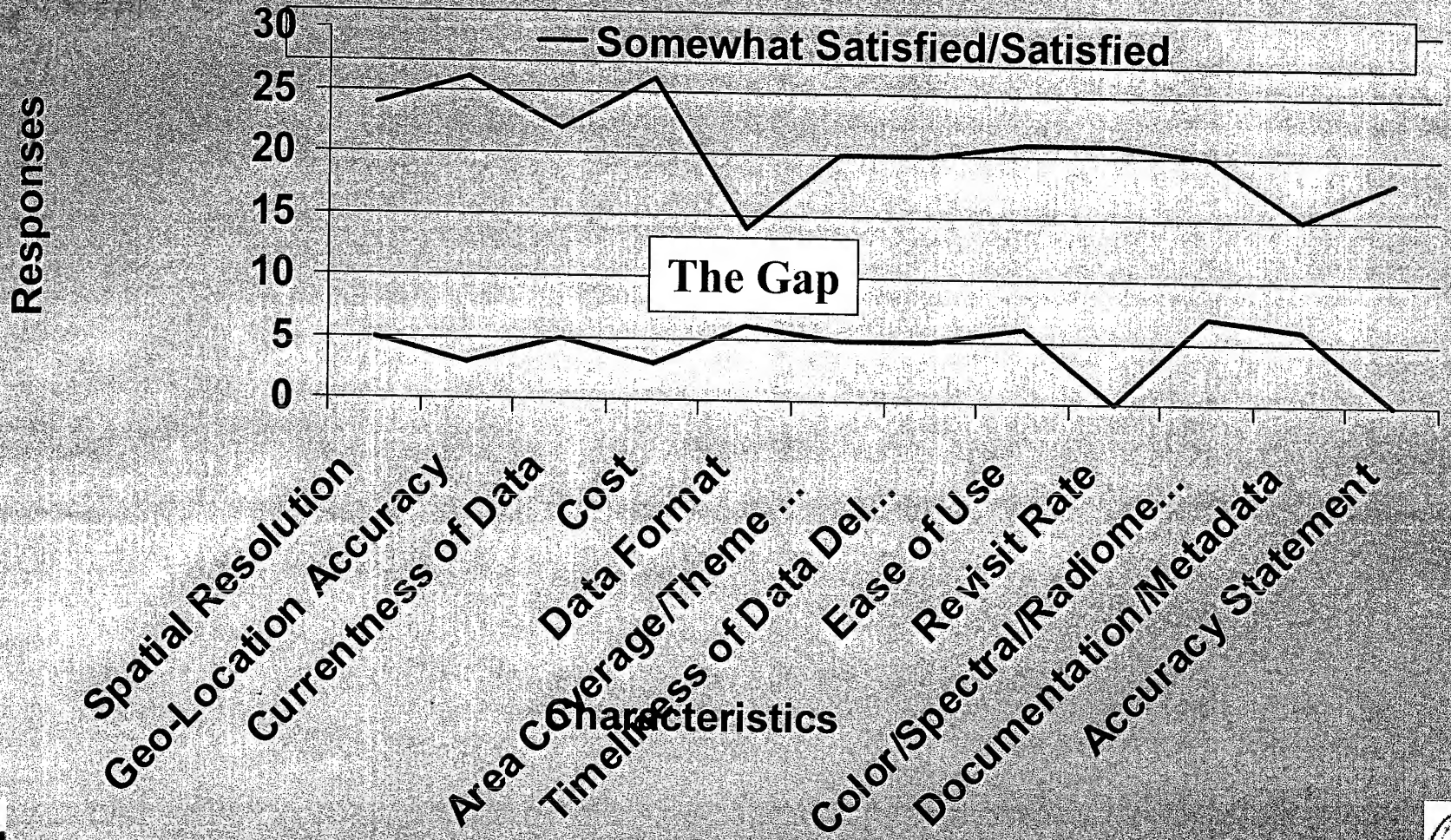
Characteristics	Sectors		
	Academic	Commercial	Government
Spatial Resolution	1	3	3
Geo-Location Accuracy	3	1	3
"Currentness" of Data		2	1
Cost	2	3	2
Data Format			
Area Coverage/Theme Size			3
Timeliness of Data Delivery			
Ease of Use			
Revisit Rate			
Color/Spectral/Radiometric Quality	3		
Documentation/Metadata			
Accuracy Statement			3

1 Most Important

- **Apparently, Spatial Resolution, Geo-Location Accuracy and Cost are the *Most Important (1)* Characteristics**
- **Cost is important, but does not seem to be the primary driver**
- ***These results are virtually the same as our interview results***

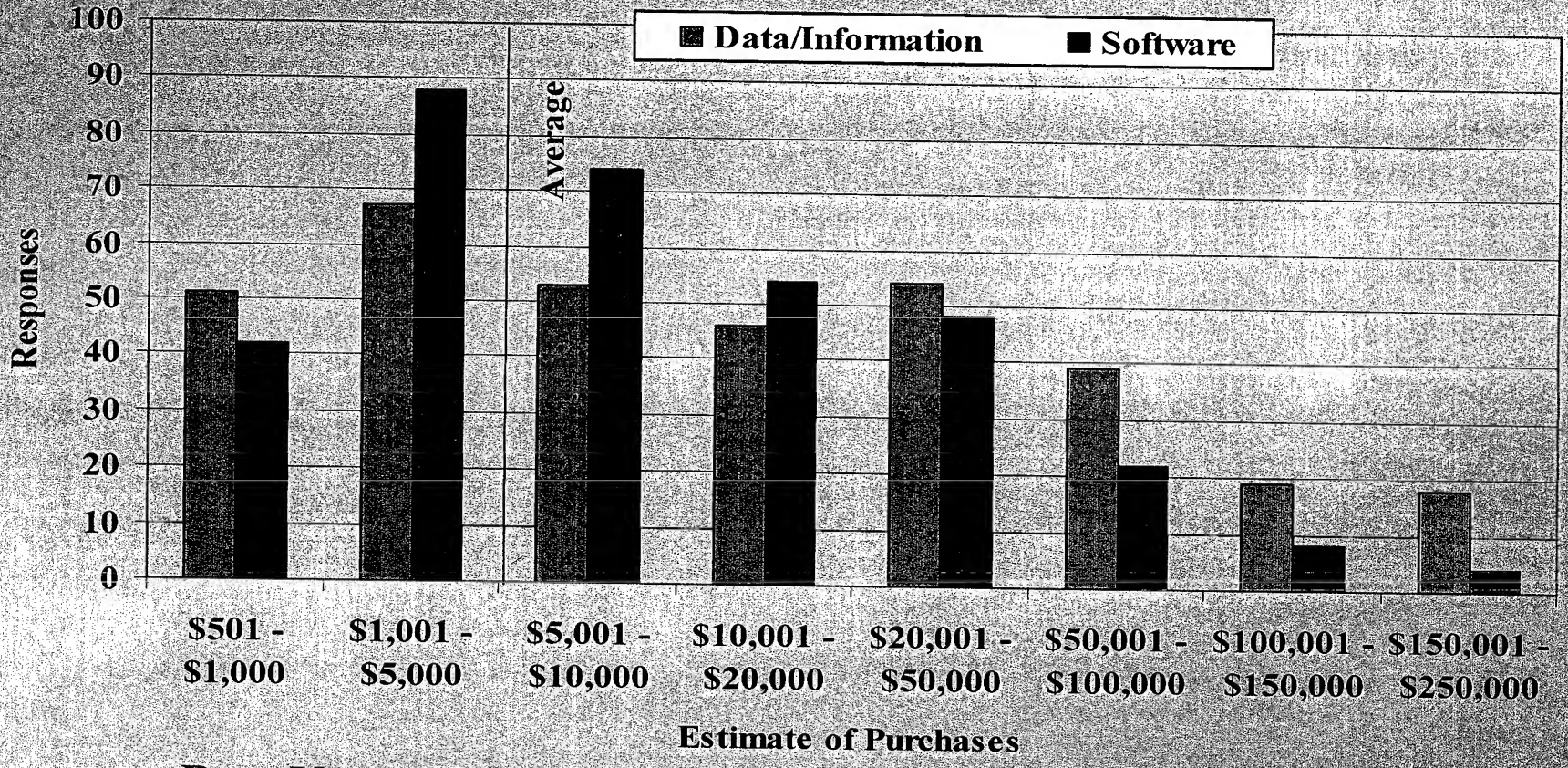
Satisfaction with D/I/S Characteristics: All Sectors

Assume the "Somewhat Satisfied" and "Satisfied" dimensions are nearly the same. Make a similar assumption re: "Very Satisfied" and "Extremely Satisfied"



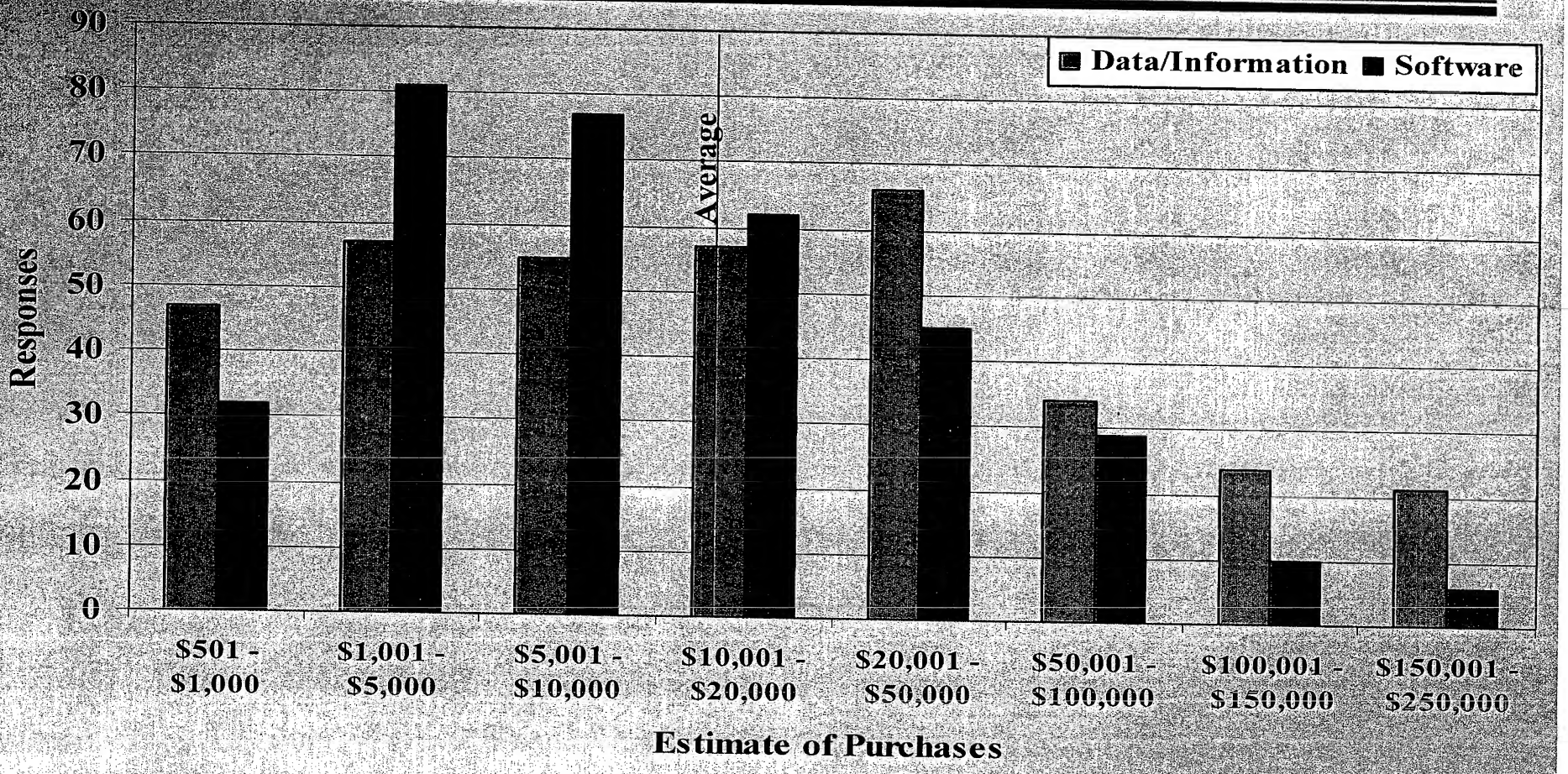
There apparently is room for improvement in "Satisfaction"

Manager Estimates of D/I/S Purchases: 2000



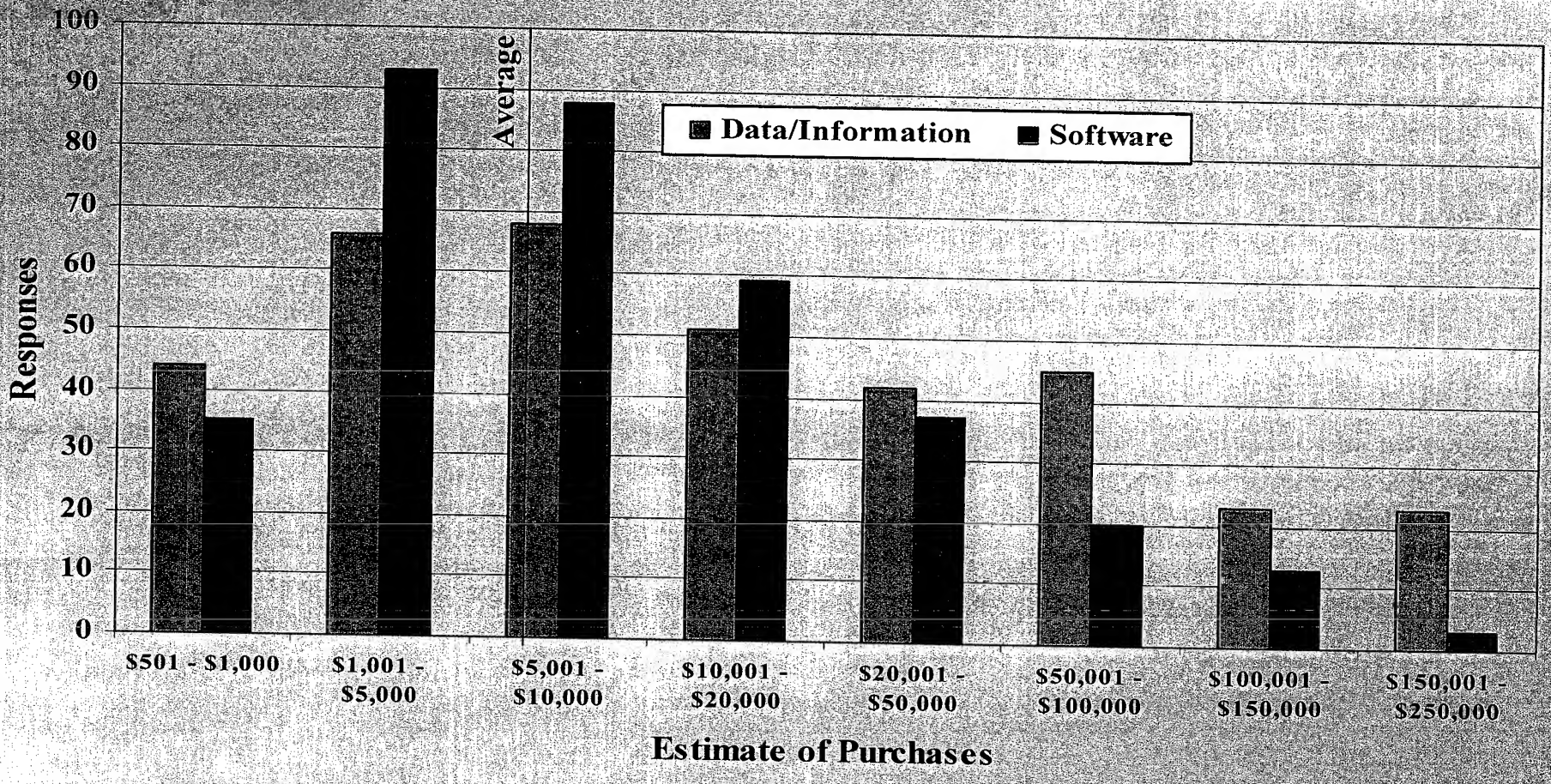
Base Year. No real change in purchase trends from 1999

Manager Estimates of D/I/S Purchases: 2001



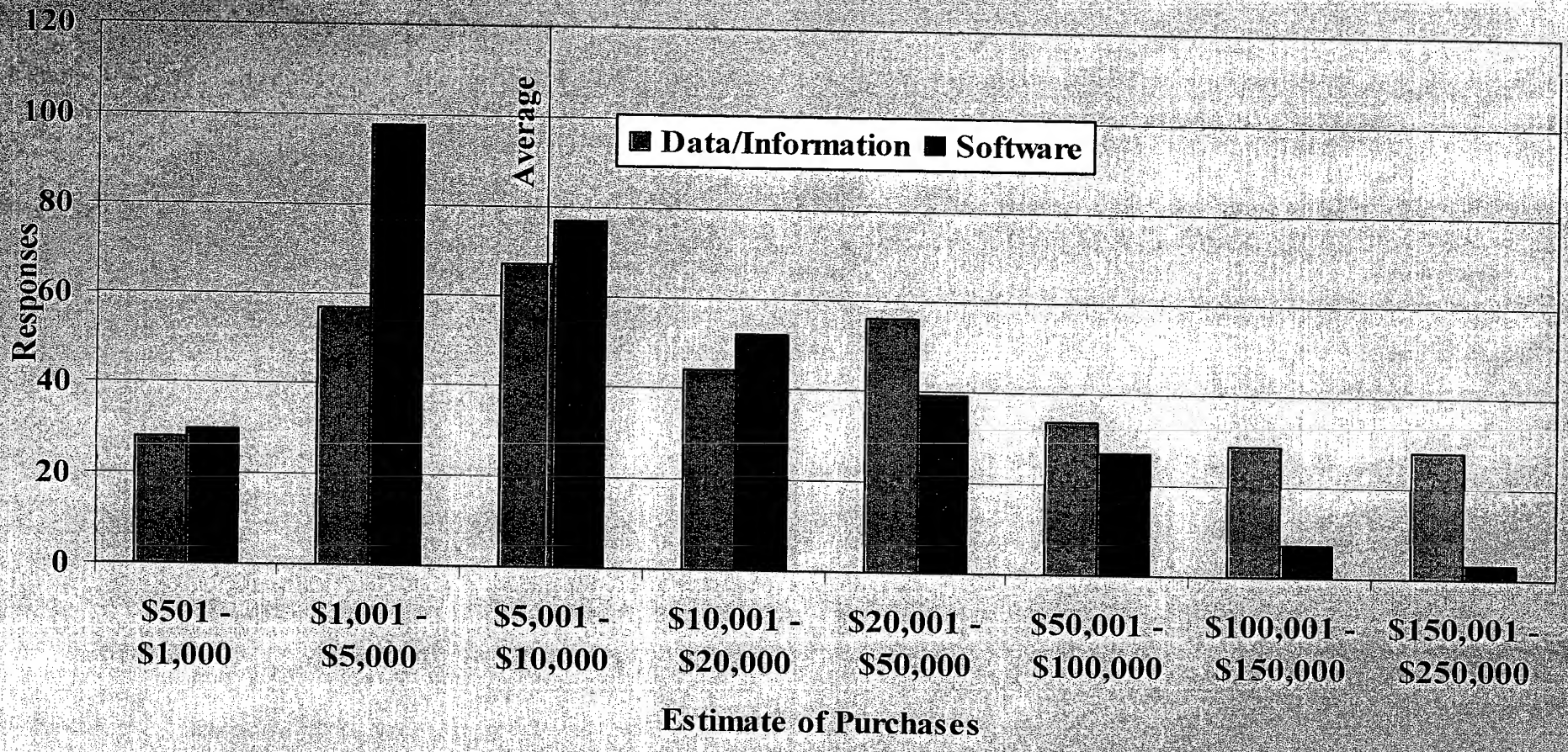
Data/Information purchases show growth trend; Software stays same

Manager Estimates of D/I/S Purchases: 2002



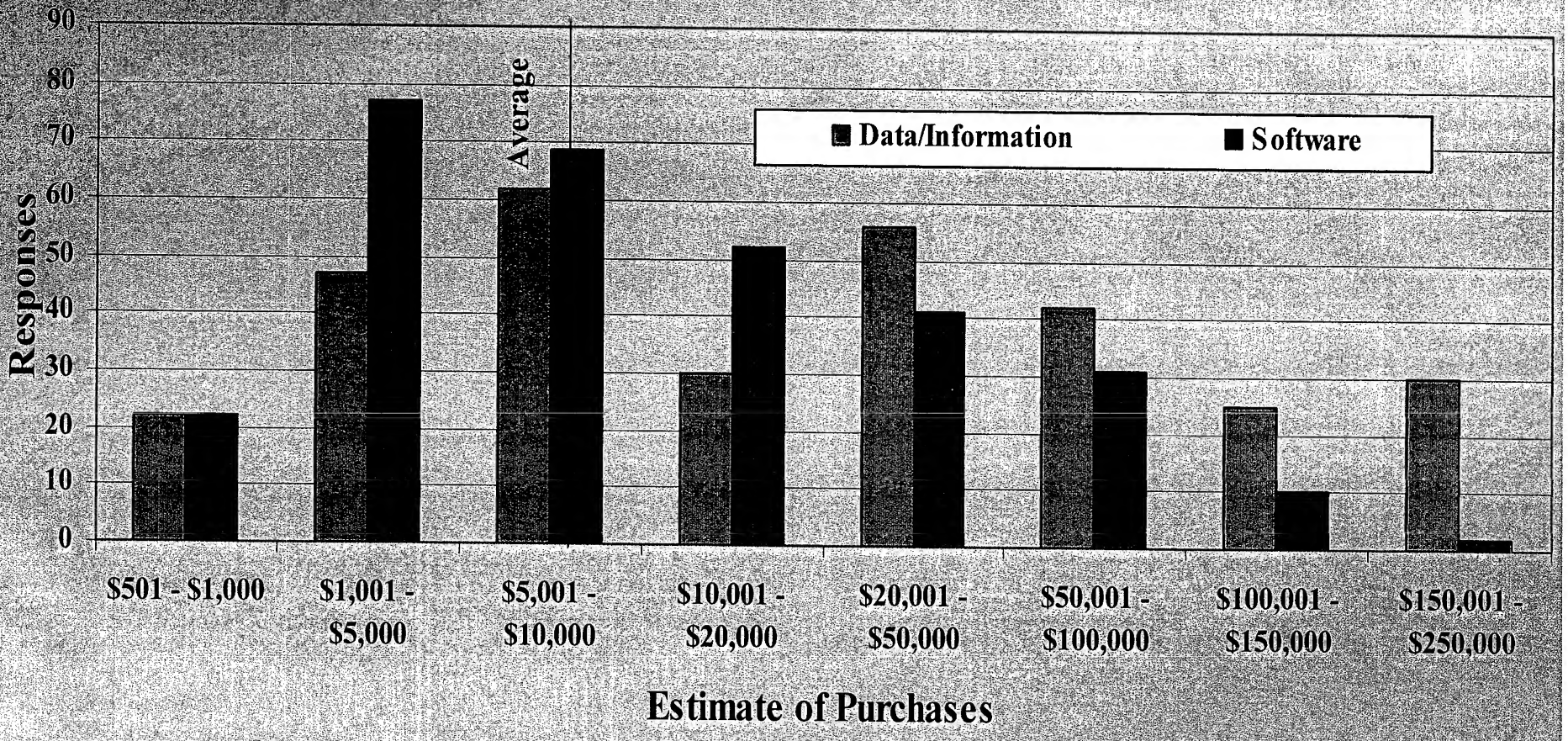
Data/Information revert to 2000 levels; Software stays the same

Manager Estimates of D/I/S Purchases: 2005



Like 2001. Data/Information shows growth trend; Software stays same

Manager Estimates of D/I/S Purchases: 2010



- Like 2005. Data/Information Continues growth trend; Software stays same
- Data/Information approximates Bi-modal. About Half predict increases

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14. ABSTRACT